



Polarized Protons for Run 4

Caveats and Comments:

- Formal discussions within the STAR collaboration about Run 4 are just beginning.
- Initial discussions about Run 4 by the STAR spin physics working group were held yesterday.
- Guidance from August, 2002 STAR Multi-Year Beam Use Request regarding run 4:

Au+Au $\sqrt{s_{NN}}=200$ GeV 16 weeks

Au+Au $\sqrt{s_{NN}}=20$ GeV 1 week

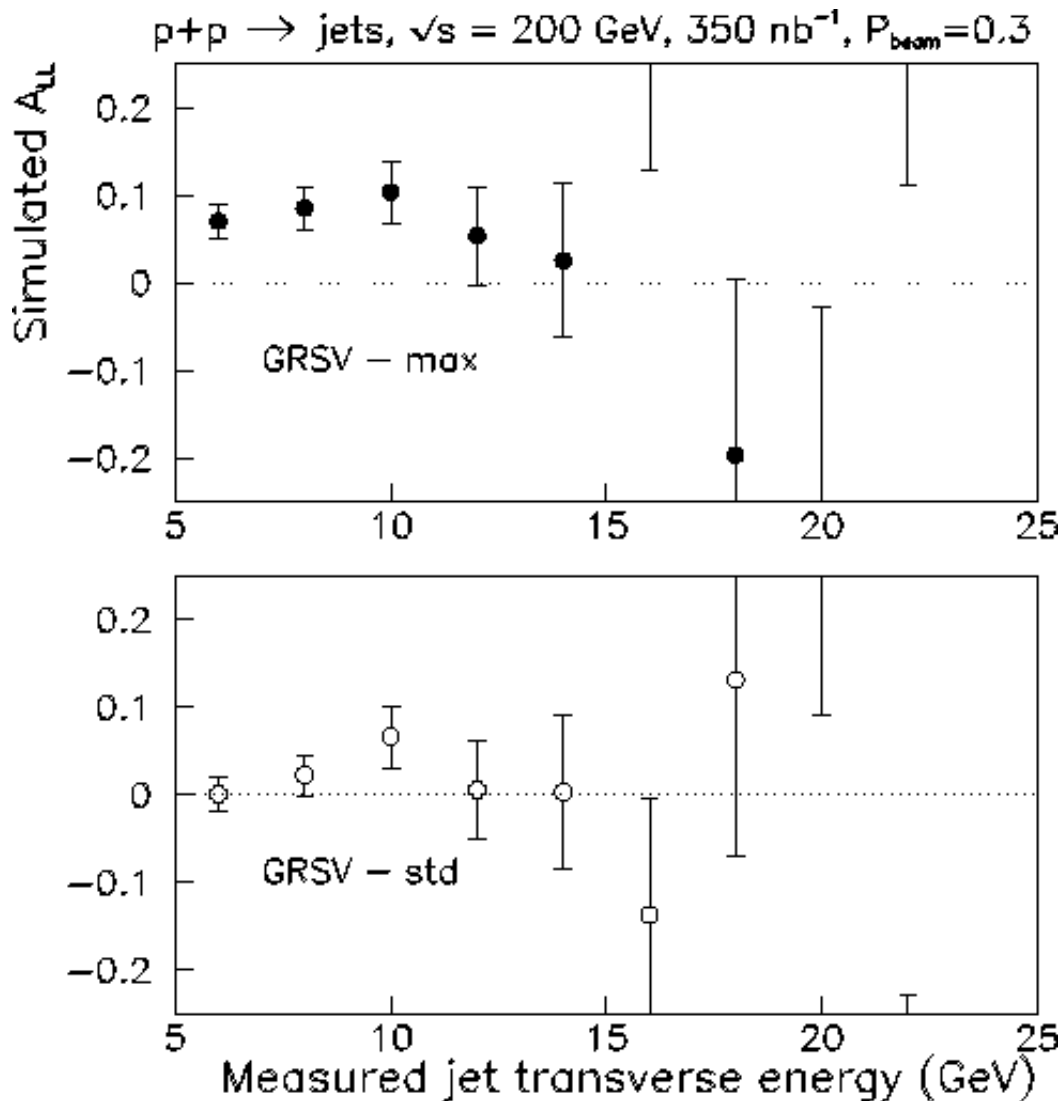
Au+Au $\sqrt{s_{NN}}=40$ GeV 1 week

Au+Au $\sqrt{s_{NN}}=80$ GeV 1 week

pol. p+p $\sqrt{s}=200$ GeV ~ 8 weeks

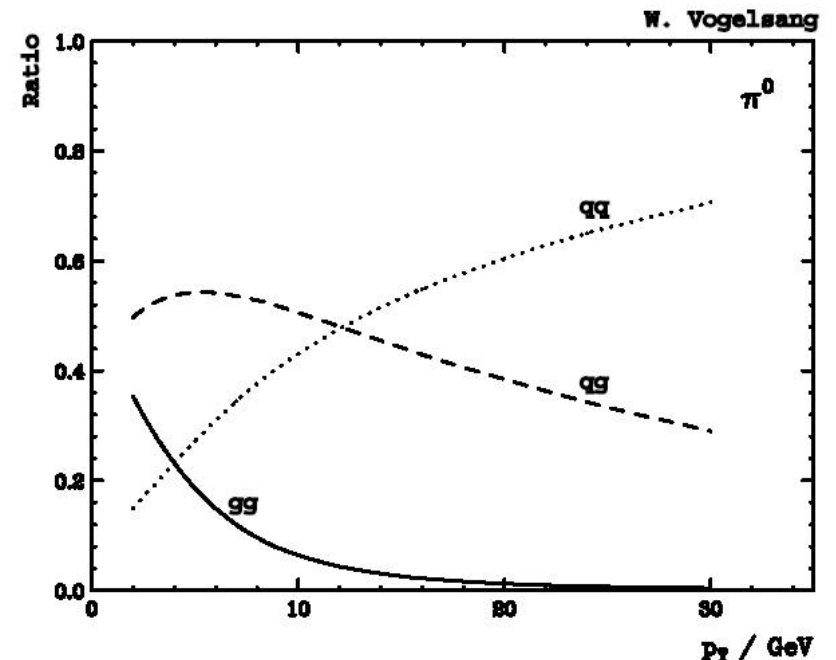
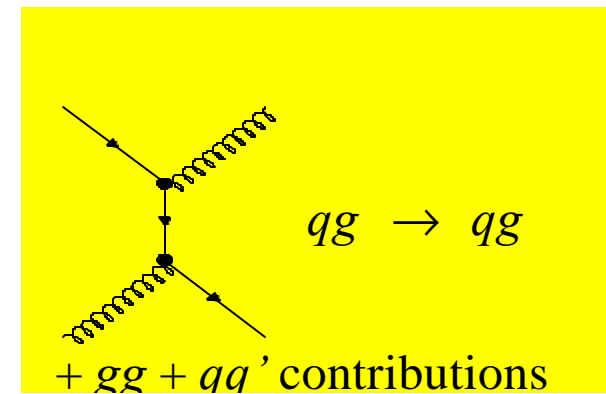
\Rightarrow continuation of A_{LL} measurement

Projections for Sensitivity to ΔG from Run 3



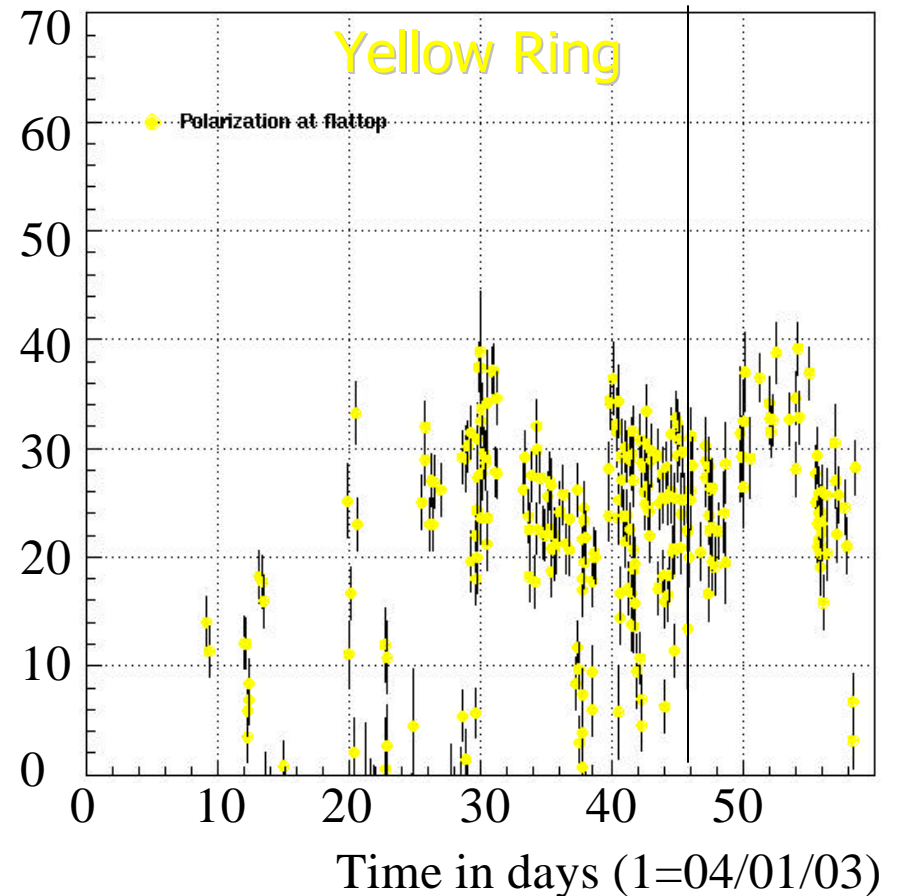
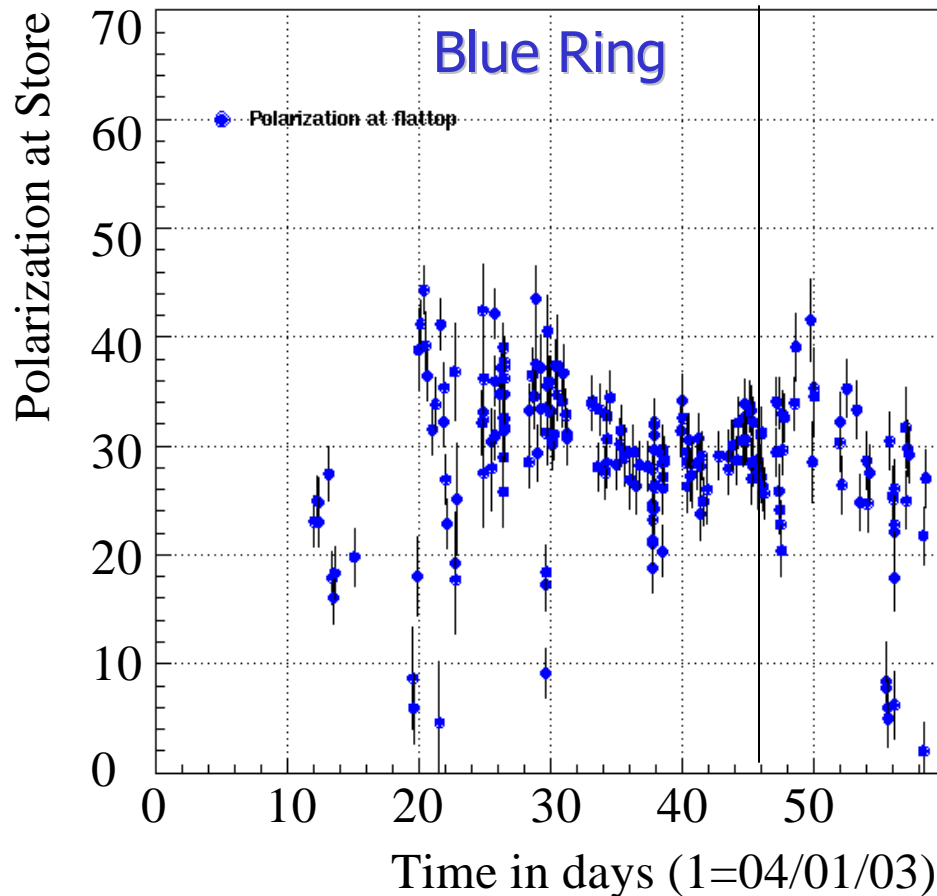
Longitudinal spin asymmetry (A_{LL}) for mid-rapidity jet production

\Rightarrow first measurements sensitive to gluon polarization



RHIC Polarization at store for Run 3

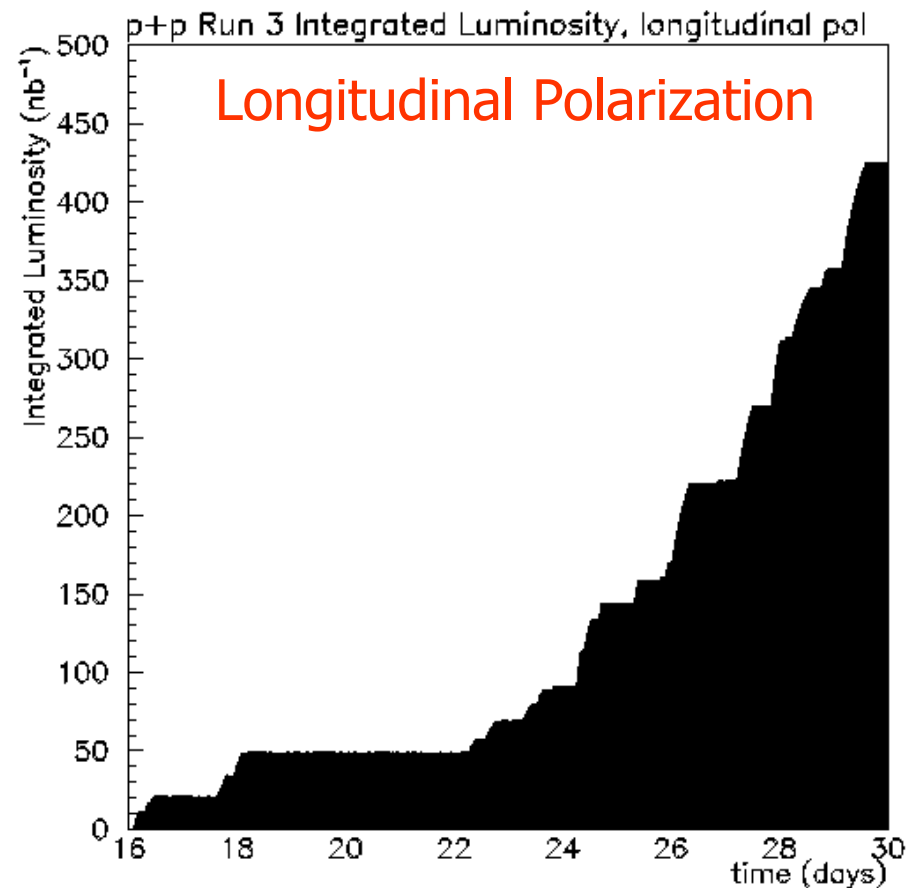
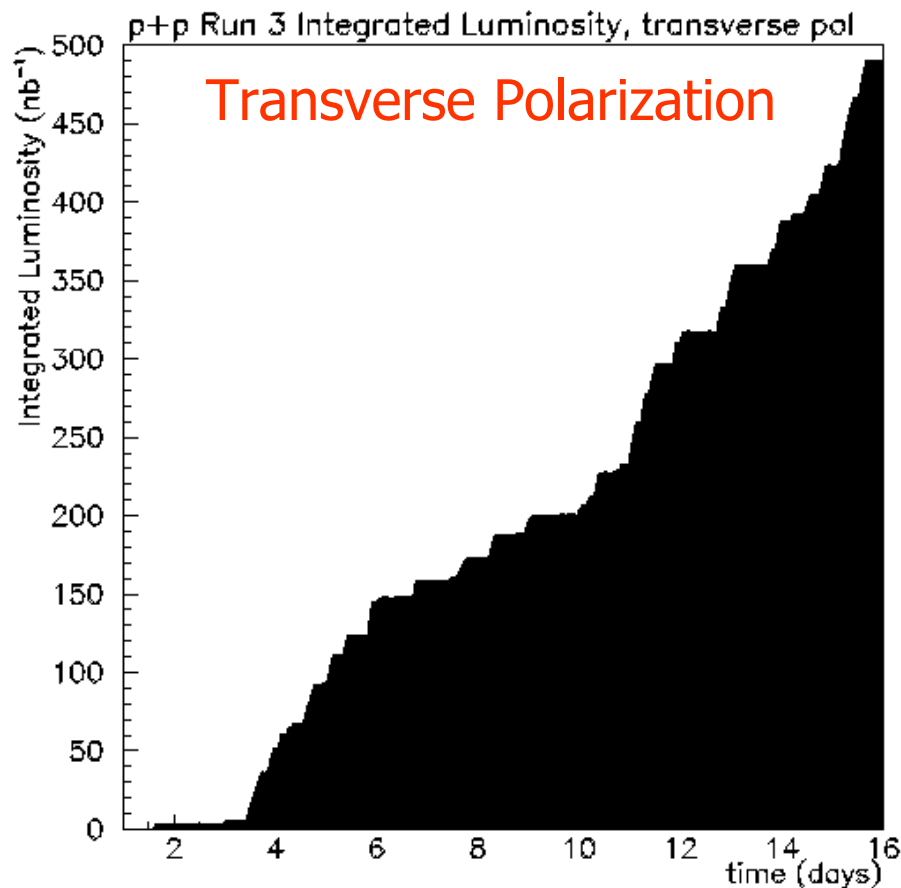
⇒ Longitudinal polarization at STAR after May 15



- RHIC polarization improved by factor of ~2 compared to run 2
- Yellow ring affected by problem with snake magnet



p+p Integrated Luminosity for Run 3 Delivered to STAR IR



- $\int \mathcal{L} dt$ determined from STAR beam-beam counter in May, 2003.
- Approximately half of the delivered $\int \mathcal{L} dt$ for longitudinal polarization had all STAR subsystems at operating voltages.



Summary of Run 3 Sensitivity to ΔG

Plans versus Reality

- Polarization: plan was $P^2=0.09$ / reality was $P^2\sim 0.06$
- $\int \mathcal{L} dt$: plan was 350 nb^{-1} / reality was $\sim 200 \text{ nb}^{-1}$ recorded

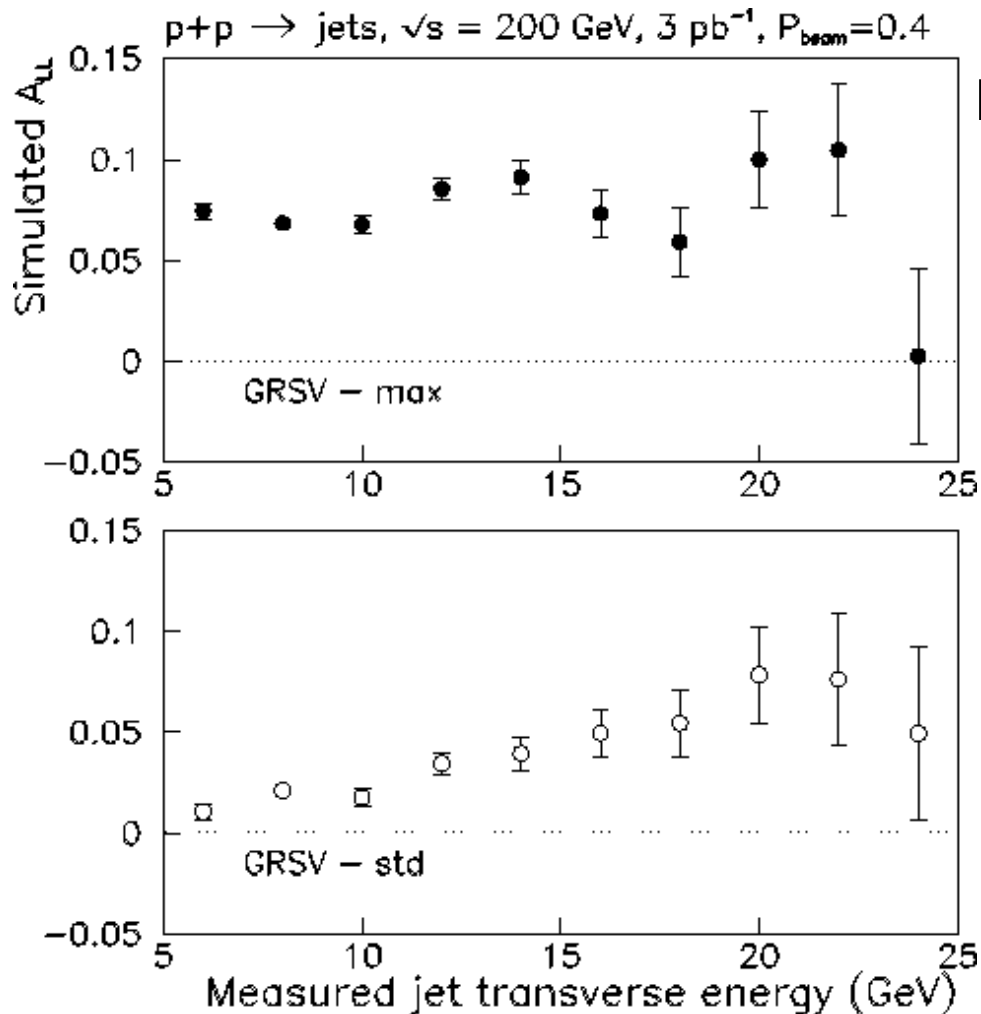
Analysis Tasks towards ΔG sensitivity

- incorporate barrel EMC data into jet finder
- understand trigger bias on inclusive jet production
- analyze relative luminosity data





Some Thoughts on Run 4



Likely goals for polarized protons in run 4

- Commissioning of RHIC/AGS complex (~ 5 weeks)

- o Progress towards goal of $\sim 30 \text{ pb}^{-1}/\text{week}$, with $P_{\text{beam}}=70\%$
- o Commissioning of polarized gas jet target: FY04 goal $\Delta P/P \sim 10\%$ at 100 GeV

- Physics Running (~ 3 weeks)

- o contingent on $P^4 \times \mathcal{L}_{\text{avg week}} > 10 \text{ nb}^{-1}$
($\mathcal{L}_{\text{avg week}} > 1 \text{ pb}^{-1}$ $P > 30\%$)

- + Simulation based on Pythia including trigger and jet reconstruction efficiencies
- + Assume: Coverage of EMC (barrel) $0 < \phi < 2\pi$ and $0 < \eta < 1$
- + Jet Trigger: $E_T > 5 \text{ GeV}$ over at least one "patch" $(\Delta\eta = 1) \times (\Delta\phi = 1)$
- + Jet reconstruction: Cone algorithm (seed = 1 GeV, $R = 0.7$)

Expect 75% of barrel and completed endcap EMC for Run 4

Longer Range Issues

- Credible plan for increase in polarized proton luminosity
- Progress towards higher luminosity & polarization in each run
- Focus on long polarized proton run at $\sqrt{s} = 500$ GeV is contingent on projected $\int \mathcal{L} dt$ and beam polarization.